

WHAT IS CLAIMED IS:

1 1. An optical semiconductor device comprising a plurality
2 of semiconductor lasers which oscillate longitudinal single
3 mode laser beams based on a periodic change in refractive index
4 or a periodic change in gain and have been simultaneously
5 formed with mutually different oscillation wavelengths on a
6 single substrate,

7 said plurality of semiconductor lasers being identical to
8 each other in coupling coefficient independently of the
9 oscillation wavelength.

1 2. An optical semiconductor device comprising a plurality
2 of semiconductor lasers which oscillate longitudinal single
3 mode laser beams based on a periodic change in refractive index
4 or a periodic change in gain and have been simultaneously
5 formed with mutually different oscillation wavelengths on a
6 single substrate,

7 said plurality of semiconductor lasers being provided
8 with diffraction gratings having heights corresponding
9 respectively to the oscillation wavelengths.

1 3. The optical semiconductor device according to claim 2,
2 wherein said plurality of semiconductor lasers are a
3 distributed feedback (DFB) semiconductor laser or a distributed
4 bragg reflector (DBR) semiconductor laser.

1 4. The optical semiconductor device according to claim 2,

2 wherein said plurality of semiconductor lasers comprise a laser
3 active layer comprising a guide layer and a multiple quantum
4 well (MQW) layer.

1 5. A process for producing an optical semiconductor
2 device comprising a plurality of semiconductor lasers which
3 oscillate longitudinal single mode laser beams with different
4 wavelengths and have been simultaneously formed on a single
5 substrate, said process comprising the steps of:
6 coating a resist on the substrate;
7 exposing the surface of the resist to a pattern of a
8 plurality of diffraction gratings for setting pitches
9 corresponding respectively to oscillation wavelengths for the
10 plurality of semiconductor lasers and for setting heights which
11 provide an identical coupling coefficient independently of the
12 oscillation wavelength;
13 etching the substrate in such a manner that the level of
14 etching per unit time is identical;
15 patterning a mask to give a predetermined shape according
16 to the arrangement of the diffraction gratings;
17 forming a laser active layer on each of the diffraction
18 gratings using the mask having a predetermined shape by
19 selective MOVPE growth (metal-organic vapor phase epitaxy); and
20 forming an electrode on each of the top surface of the
21 laser active layer and the backside of the substrate.

1 6. The process according to claim 5, wherein a larger
2 height of the diffraction grating is adopted for a laser having

3 a smaller coupling coefficient when the diffraction grating is
4 unchanged.

1 7. The process according to claim 5, wherein the height
2 of the diffraction grating is set by the opening width of the
3 resist.

1 8. The process according to claim 5, wherein a narrower
2 resist opening width is adopted for a laser having a smaller
3 coupling coefficient when the diffraction grating is unchanged.

1 9. The process according to claim 5, wherein
2 the patterning to give a predetermined shape involves
3 patterning of electro-absorption optical modulators coupled
4 respective to the semiconductor lasers, and
5 the selective MOVPE growth involves selective MOVPE
6 growth for the formation of an absorption layer in the electro-
7 absorption optical modulator.